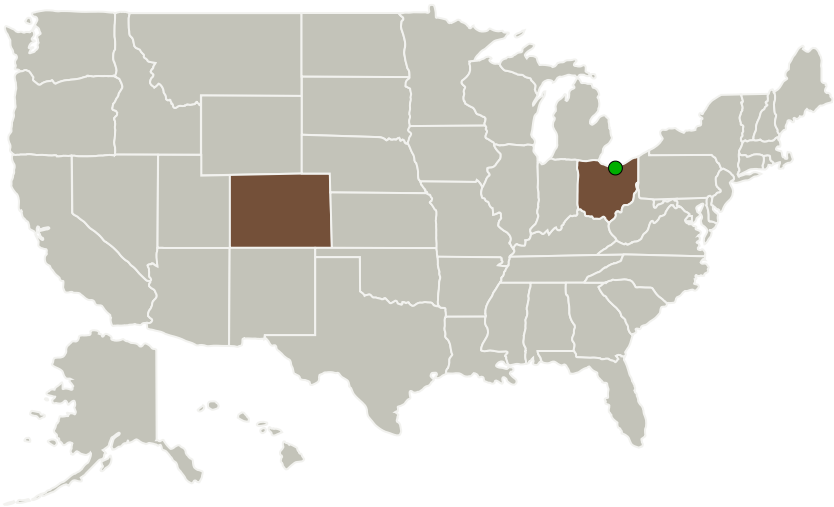
Solid-fueled Micro Colloid Thruster, Phase I

Completed Technology Project (2012 - 2013)

Project Introduction

Nanosatellites are receiving increased interest since they are proving reliable for surveillance, communication and other space missions. Also, the possibility of launching "constellations" of them offers unique capabilities for low-cost experimentation, sensing and communications in space. In comparison to larger spacecraft, their development time and costs have reduced and their launch costs are low. As a result several agencies have recently launched nanosats to test their ability to perform different missions. Unfortunately, none of these nanosats have had onboard propulsion systems, which would provide greater flexibility to position the satellite throughout the mission. There are several promising thruster concepts for nanosats which could provide attitude control and orbital transfer maneuvers (uN to mN thrust levels, respectively). Of these, the colloid thruster is most attractive since it is highly efficient even when scaled down to the micro scale. However, further development is still needed to meet the power, weight and volume constraints for fitment within a nanosat. Therefore, TDA Research, Inc. and the University of Colorado-Boulder propose to develop a solid-fueled micro colloid thruster. In Phase I we will melt a solid salt and supply it to the micro volcano emitter that will be used in Taylor cone experiments to determine its operating characteristics and evaluate its overall performance.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
TDA Research, Inc.	Lead Organization	Industry	Wheat Ridge, Colorado
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
University of Colorado Boulder	Supporting Organization	Academia	Boulder, Colorado

Primary U.S. Work Locations	
Colorado	Ohio

Project Transitions

February 2012: Project Start

February 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138519)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TDA Research, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

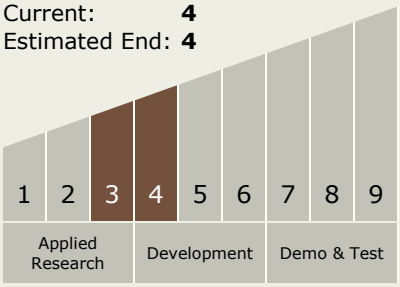
Carlos Torrez

Principal Investigator:

James Nabity

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System